

## CLAIMS

THE FOLLOWING IS CLAIMED:

1        1. A process for low-damage anisotropic dry etching of a substrate, comprising the  
2 steps of:

3              placing a substrate on a mechanical support within a plasma reactor, said  
4 mechanical support isolated from the creation of the plasma; and

5              subjecting the substrate to a plasma including low energy electrons having a  
6 kinetic energy less than about 100 eV and at least one species reactive with the substrate.

1        2. The process of Claim 1, further comprising the step of selecting said substrate  
2 from the group consisting of Group III-V semiconductors, Group IV semiconductors, Group II-  
3 VI semiconductors, metals, alloys of the foregoing, superconductors, polymers, and insulating  
4 substrates.

1        3. The process of Claim 1, wherein said plasma reactor generates a dc plasma.

1        4. The process of Claim 1, wherein said plasma reactor generates an ac plasma.

1        5. The process of Claim 1, wherein said mechanical support is electrically biased,  
2 said mechanical support imparting said electrical bias upon the substrate.

1        6. The process of Claim 5, wherein said mechanical support imparts a dc electrical  
2 bias upon the substrate .

1        7. The process of Claim 5, wherein said mechanical support imparts an ac bias upon  
2 the substrate.

1        8. The process of Claim 5, wherein said mechanical support imparts both a dc and an  
2 ac bias upon the substrate.

1        9. The process of Claim 5, further comprising the step of periodically modulating  
2 said electrical bias of said mechanical support to a value below that of a value of the plasma.

1        10. The process of Claim 1, further comprising the step of including an additional  
2 structure within said plasma, said additional structure capable of being electrically biased.

1        11. The process of Claim 10, wherein said additional structure is dc electrically  
2 biased.

1        12. The process of Claim 10, wherein said additional structure is ac electrically  
2 biased.

1        13. The process of Claim 10, wherein said additional structure is both ac and dc  
2 electrically biased.

1        14. A process for low-damage anisotropic dry etching of a substrate, comprising the  
2 steps of:

3              providing a direct current plasma reactor including a cathode and an anode;  
4              placing a semiconductor on the anode of the direct current plasma reactor;  
5              generating low energy electrons with a cold cathode;  
6              subjecting the semiconductor to a plasma including low energy electrons and a  
7              species reactive with the semiconductor; and

8              placing an additional structure within said plasma, said additional structure  
9              capable of being electrically biased.

1        15. The process of Claim 14, further comprising the step of selecting said substrate  
2 from the group consisting of Group III-V semiconductors, Group IV semiconductors, Group II-  
3 VI semiconductors, metals, alloys of the foregoing, superconductors, polymers, and insulating  
4 substrates.

1        16. The process of Claim 14, wherein said additional structure is dc electrically  
2 biased.

1        17. The process of Claim 14, wherein said additional structure is ac electrically  
2 biased.

1        18. The process of Claim 14, wherein said additional structure is both ac and dc  
2 electrically biased.

1        19. An apparatus for low-damage anisotropic dry etching of a substrate, comprising:  
2              a plasma reactor; and  
3              a mechanical support within said plasma reactor, said mechanical support isolated  
4 from the creation of the plasma.

1        20. The apparatus of Claim 19, wherein said substrate is selected from the group  
2 consisting of Group III-V semiconductors, Group IV semiconductors, Group II-VI  
3 semiconductors, metals, alloys of the foregoing, superconductors, polymers, and insulating  
4 substrates.

1        21. The apparatus of Claim 19, wherein said plasma reactor generates a dc plasma.

1        22. The apparatus of Claim 19, wherein said plasma reactor generates an ac plasma.

1        23. The apparatus of Claim 19, wherein said mechanical support is electrically biased,  
2        said mechanical support imparting said electrical bias upon the substrate.

1        24. The apparatus of Claim 23, wherein said mechanical support imparts a dc  
2        electrical bias upon the substrate .

1        25. The apparatus of Claim 23, wherein said mechanical support imparts an ac bias  
2        upon the substrate.

1        26. The apparatus of Claim 23, wherein said mechanical support imparts both a dc  
2        and an ac bias upon the substrate.

1        27. The apparatus of Claim 19, further comprising an additional structure within said  
2        plasma, said additional structure capable of being electrically biased.

1        28. The apparatus of Claim 27, wherein said additional structure is dc electrically  
2        biased.

1        29. The apparatus of Claim 27 , wherein said additional structure is ac electrically  
2        biased.

1        30. The apparatus of Claim 27, wherein said additional structure is both ac and dc  
2        electrically biased.

1        31. An apparatus for low-damage anisotropic dry etching of a substrate, comprising:  
2        a direct current plasma reactor including a cathode and an anode;  
3        a semiconductor placed on the anode of the direct current plasma reactor;  
4        means for generating low energy electrons with a cold cathode;

5           means for subjecting the semiconductor to a plasma including low energy  
6   electrons and a species reactive with the semiconductor; and  
7           an additional structure within said plasma, said additional structure capable of  
8   being electrically biased.

1           32.   The apparatus of Claim 31, wherein said substrate from the group consisting of  
2   Group III-V semiconductors, Group IV semiconductors, Group II-VI semiconductors, metals,  
3   alloys of the foregoing, superconductors, polymers, and insulating substrates.

1           33.   The apparatus of Claim 32, wherein said additional structure is dc electrically  
2   biased.

1           34.   The apparatus of Claim 32, wherein said additional structure is ac electrically  
2   biased.

1           35.   The apparatus of Claim 32, wherein said additional structure is both ac and dc  
2   electrically biased.